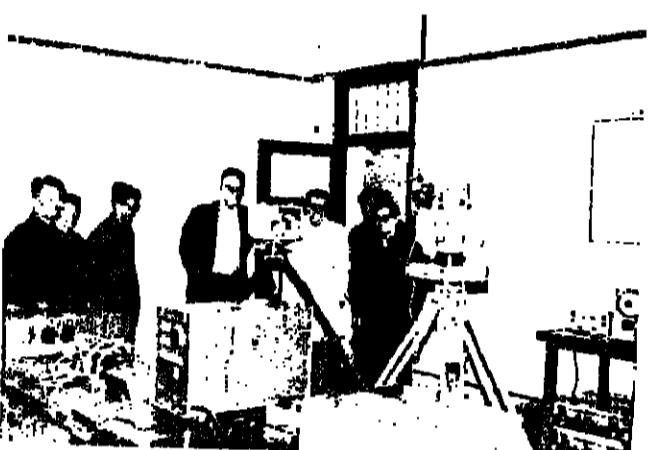




Among scores of instruments in Wuhan College's Photogrammetry Department, Williams and Mancini found this three-stage comparator. Many of the instruments were made in China, some by the college in its own optical and milling facilities.

During the discussions, Li Qinghai, professor of geodesy and vice-chairman of the academic commission of the college, reported that China began to pay attention to developments in satellite geodesy in 1974, recognizing the important benefits it offered to the military and to the national geodetic networks. They since agreed that China should become active in the international satellite programs and should take steps to develop their people as well as the technology to take part in world programs.

Li added that the Chinese had studied every paper in MC&G available in the open literature. As part of their geodetic satellite program, they have purchased Magnavox and Marconi Doppler receivers and, in 1980, had observed 37 Doppler stations as an initial network across China. They currently have the GEODOP short-arc Doppler reduc-



Williams (left) and Mancini visit an instrumentation laboratory containing surveying angle and distance-measuring equipment.

EOS

TRANSACTIONS, AMERICAN GEOPHYSICAL UNION

The Weekly Newspaper of Geophysics

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Views expressed in this publication are those of the authors only and do not reflect official positions of the American Geophysical Union unless expressly stated.

Cover: A conceptual model of the cyclonic upwelling system, from an article by E. D. Traganos, J. C. Conrad, and L. C. Brecker. Extracted from AGU's latest publication, *Coastal Upwelling*, the first book in a new series, *Coastal and Estuarine Sciences*. Turn to page 661 for more details.

tion programs but are having some difficulty understanding parts of it because of inadequate documentation. That story sounded very familiar and all too common to us.

There is little doubt to us that the college is a fine institution. The faculty consists of the best-qualified scientists and engineers in the country, many with advanced degrees from Western universities. It is the only civilian MC&G college in the PRC. The vice rector, Wang Zhizhou, is a photogrammetrist, educated in England, and Li, mentioned earlier, is a geodesist, taught in the U.S. Their curriculum for the various programs appeared to us to be quite comprehensive, lacking somewhat only in the satellite geodesy area and perhaps in digital photogrammetry and digital mapping. Their facilities were better than found in most of our universities, except that some of the shop and laboratory equipment was not current vintage.

Research Institute

The Research Institute in Beijing, also an element of the NBSM, consists of 300 scientists and technicians organized into the disciplines of geodesy, cartography, photogrammetry, information sciences, and computer technology.

A tour of the facility showed us a newly installed Kodak microfilm system consisting of an MRC-1 Recordak, a versatile processor, an enlarging camera, and a microfilm storage and retrieval system. We noted that DMA and the development laboratories had not yet found a suitable system for microfilming maps to retain the detail and accuracy we required.

We were also briefed on an automated cartography program that the institute had just started. It included a stereoplotter with digital pickoffs and an X-Y flatbed plotter for outputting contours on a scribe coat. The system, an adaptation of electronic servos to existing plotters, was slow and used punched paper tape to drive the plotters. The tape input was not very efficient, but the scribing results looked extra good.

Their computer facility included a DJS-6 192K memory floating point system which used punched tape as input and a drum plotter as output. Made in China, the system used Fortran and ALGOL language. It is used for scientific computations and digital cartographic processing.

The geodetic portion of the tour included a walk-through briefing of their Marconi Doppler receiver laboratory, a new Hewlett-Packard minicomputer, and a clock fabricated by them for use in a satellite optical tracking system. The Research Institute also makes its own high-quality film coatings for photogrammetric and cartographic processing.

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Petroleum Geophysicist/New Zealand Geological Survey. New Zealand is undergoing major expansion of its energy resource investigations including prospecting for hydrocarbons. The Department of Scientific and Industrial Research, the principle Government R & D Agency, and advisor to government and industry in science and technology, has a vacancy in its Geological Survey for a seismic interpreter. The position, in the Petroleum Basin Studies Section requires a person with a sound geological background primarily for regional analysis for the Basin Studies Programme. Qualifications: A good 3 year bachelor's degree or higher, and at least 3 years petroleum exploration experience, are preferred.

Salary: A salary of up to NZ\$23,520 per annum is offered for this position, depending on qualifications and experience.

Further information, application forms etc., may be obtained from the Ambassador Extraordinary and Plenipotentiary, New Zealand Embassy, Washington D.C. Applicants should quote Vacancy No. 2557 and forward applications, accompanied by a resume, to:

The Ambassador Extraordinary and Plenipotentiary,

New Zealand Embassy
Observatory Circle, N.W.
Washington 20000
United States of America

Closing date for applications November 3, 1981.

Geophysicist/Geologist The University of Texas at Austin, Institute for Geophysics. Four research scientist positions are now available at the University of Texas Institute for Geophysics in the fields of marine geophysics, tectonics, seismic stratigraphy, seismic reflection techniques and data processing, ocean bottom seismometer (OBS) and other seismographic instrument design and development, earthquake seismology, and lunar and planetary seismology.

The Institute maintains a modern dockside facility at Galveston, Texas (Galveston Marine Geophysics Laboratory), where a new mining building will be built next year. There is also a component of the Institute based in Austin. The Institute has a modern computer facility for processing and analyzing geophysical data and will be obtaining a new VAX interactive computer system early next year. The Institute maintains two research vessels, the R/V IDA GREEN and the R/V FRED H MOORE, which have capabilities for conducting marine geophysical surveys including the collection of magnetics, multi-fold seismic reflection data (48-channel), sonobuoy data, and OBS reflection and earthquake data. This two-ship capability offers the exciting opportunity to conduct two-ship seismic experiments. In addition, the Institute operates extensive seismographic networks in several Central American and Caribbean countries. The Institute maintains close ties with the staff and facilities of the Department of Geological Sciences, which include modern radiocarbon, paleo, and palaeomagnetic laboratories.

A Ph.D. degree is required, preferable in Geology or Geophysics. Salaries are negotiable depending upon experience and qualifications. The person must have the ability and desire to work on group projects, conceive and initiate new projects, collect and reduce data, and publish the results. If you are interested in this exciting opportunity to pursue a challenging career in the forefront of geophysical research in an academic setting, please send your qualifications and references to:

Director,
The University of Texas
Institute for Geophysics
Galveston Marine Geophysics
Laboratory
700 The Strand
Galveston, Texas 77550.

The University of Texas is an equal opportunity affirmative action employer.

Geophysicist North Carolina State University—Raleigh. The Department of Marine, Earth and Atmospheric Sciences is reopening the search to fill a presently available tenure track position in geophysics. Rank is at the Assistant or Associate professor level. A Ph.D. is required.

Primary responsibilities will include generating and conducting research programs as well as teaching graduate courses in geophysics. The department currently consists of 31 regular faculty members including 16 in the areas of geology and geophysics. Please send resume and names of three references to J. L. Langfelder, Head, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University, Raleigh, NC 27690. Deadline for receipt of applications is December 1, 1981.

North Carolina State University is an equal opportunity affirmative action employer.

University of Hawaii: Faculty Positions. The Department of Geology and Geophysics and the Hawaii Institute of Geophysics have openings for the 1981-1982 academic year. Rank is open dependent on qualifications. We are seeking persons who will participate in our teaching and research program in any of the following areas: (1) structural geology and marine tectonics, (2) hydrology and environmental geology, (3) marine seismology, magnetics and gravity. To apply send a letter of interest, a current vita, and 3 letters of reference to Dr. S. O. Schlüter, Chairman, Department of Geology and Geophysics, University of Hawaii, 2625 Correa Road, Honolulu, Hawaii 96822 (808 946-7826), or Dr. C. E. Hesley, Director, Hawaii Institute of Geophysics, same address (808 948-6760). Open until filled.

The University of Hawaii is an affirmative action and equal opportunity employer.

California Space Institute, University of California, Santa Barbara Research Position in Remote Sensing. Basic and applied research in some combination of remote sensing of coastal zones, land-use/land cover, natural and agricultural vegetation, and soil moisture with skills in information systems, automated image analysis, and quantitative modeling. We seek an independent worker with the goal of deepening and widening existing work in these areas on this campus. Ph.D. preferred. Rank and salary commensurate with experience. Closing date: November 30, 1981. Submit: resume, a brief account of research interests, and names of three professional referees to Dr. David S. Simons, Department of Geography, University of California, Santa Barbara, California, 93106.

The University of California, Santa Barbara, is an equal opportunity/affirmative action employer.

Senior Faculty Positions Meteorology. Applications and nominations are invited for a senior faculty position in meteorology, at the University of Utah. Eligible applicant will also be considered for chairperson of the department. Candidates must possess a Ph.D. in meteorology or a related discipline. Applicants should have teaching and research experience and be interested in participating in both the graduate and undergraduate programs. Applicants should submit curriculum vitae and names of three professional references to:

Dr. Jan Paegle
Search Committee
Department of Meteorology
University of Utah
Salt Lake City, Utah 84112

Deadline for applications November 30, 1981. The University of Utah is an affirmative action/equal opportunity employer.

Faculty Position Environmental Engineering. Beginning January or September 1982. The position requires undergraduate and graduate teaching and sponsored research activities in the areas of water quality control and water resources. An earned doctorate is required and at least one degree in civil engineering is preferred. Rank will be at the assistant professor level and salary will depend upon qualifications. Apply to: Dr. Lester A. Hoot, Chairman, Department of Civil Engineering, University of Virginia, Charlottesville, Virginia 22901.

An affirmative action/equal opportunity employer.

Research Associate/Electron Microscope. The Electron Microscopy Center at Texas A&M University invites application for the position of electron microscope specialist. Applicants should possess a working knowledge of WDS and EDS spectrometers and accompanying computer and software programs and preferably have experience in the geological sciences.

The primary duties of the position are to oversee and maintain (with the aid of service contracts) the electron microscope and ancillary equipment and to assist in teaching graduate course laboratories dealing specifically with electron microscope analysis.

Salary will be a maximum of \$20,000-12 months. Applicant should send supporting data and letter of recommendation to:

Dr. E. L. Thurton
Texas A&M University
Biological Sciences Building
College Station, Texas 77843

Texas A&M is an equal opportunity/affirmative action employer.

Geophysicist. Faculty position for 12-month, tenure track appointment. A sea-going marine seismologist with interests in seismic reflection, refraction or microseismics is sought. Candidates with strong backgrounds in non-marine seismology or other branches of marine geophysics will also be considered.

Duties include maintaining active research programs and obtaining outside funding, teaching graduate courses and supervising graduate students. Rank is Associate Professor.

Applicants who meet all requirements, but have less experience than is normally required for Associate Professor rank, will be considered for appointment at the rank of Assistant Professor. Salary—\$24,000 to \$32,000, commensurate with experience.

Send resume and names of three references by October 1, 1981 to: G. Ross Heath, Dean, School of Oceanography, Oregon State University, Corvallis, Oregon 97331.

OSU is an affirmative action/equal opportunity employer.

City University of New York, (Brooklyn College): Faculty Positions. The Department of Geology anticipates filling several tenure track positions at Full Professor level. (Salary range up to \$43,000). Highly qualified individuals will be considered for distinguished appointments as an additional \$5,000.

While candidates who have distinguished themselves in any field are welcome to contact us, we are particularly interested in openings in: energy resources (coal, petroleum), exploration geophysics, environmental geology or hydrogeology, coastal sedimentology, and gravity.

Please apply send a letter of interest to Dr. S. O. Schlüter, Chairman, Department of Geology and Geophysics, University of Hawaii, 2625 Correa Road, Honolulu, Hawaii 96822 (808 946-7826), or Dr. C. E. Hesley, Director, Hawaii Institute of Geophysics, same address (808 948-6760). Open until filled.

Brooklyn College, CUNY, is an affirmative action/equal opportunity employer.

University of Hawaii: Faculty Positions. The Department of Geology and Geophysics and the Hawaii Institute of Geophysics have openings for the 1981-1982 academic year. Rank is open dependent on qualifications. We are seeking persons who will participate in our teaching and research program in any of the following areas: (1) structural geology and marine tectonics, (2) hydrology and environmental geology, (3) marine seismology, magnetics and gravity. To apply send a letter of interest, a current vita, and 3 letters of reference to Dr. S. O. Schlüter, Chairman, Department of Geology and Geophysics, University of Hawaii, 2625 Correa Road, Honolulu, Hawaii 96822 (808 946-7826), or Dr. C. E. Hesley, Director, Hawaii Institute of Geophysics, same address (808 948-6760). Open until filled.

The University of Hawaii is an affirmative action and equal opportunity employer.

Assistant/Associate Professor Mackay School of Mines University of Nevada-Reno

The Department of Geological Sciences invites applications for the tenure track academic year position of assistant or associate professor of Geology to teach undergraduate and graduate courses (M.S. and Ph.D.). We are seeking an outstanding person with potential for teaching, establishing new laboratories and conducting and supervising research in the Basin and Range and adjoining Provinces. Publishable research will be expected. Areas of expertise within geology which will receive favorable consideration are structural geology, sedimentology, stratigraphy and carbonatic petrology.

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URANIUM DEPOSITS. If you are financing, planning, designing, exploring, drilling, or digging in connection with any form of energy, you need this complete, up-to-date book about the world's uranium deposits. Includes production and reserves for mines. Hardcover 6 x 9 inches, 303 pages, Table of contents, drawings, index, references, \$36. Talsach Associates, 120 Thunder Road, Sudbury, Mass. 01776.

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ATMOSPHERIC & EARTH SCIENCES
ENGINEERING & LIFE SCIENCES
PHYSICS & CHEMISTRY
ENVIRONMENTAL SCIENCES
MATHEMATICS & SPACE SCIENCES

Most of the 18 programs are open to non-U.S. nationals, and most are open to senior investigators as well as recent Ph.D.s.

Applications with details on research opportunities and laboratory locations are available from:

Associate Office (JH 610-01)
NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Postmark deadline for applications: January 15.

Equal opportunity/affirmative action, item IX section 504 employee.

Yale University/Department of Geology and Geophysics. Applications are solicited for a faculty position in solid earth geophysics to begin in the academic year 1982-83. Areas of interest to the Department include seismology, exploration geophysics, mechanical and physical properties of rocks and minerals, geomagnetism, and tectonics.

Yale University is an equal opportunity/affirmative action employer.

Research Associate/Electron Microscope. The Electron Microscopy Center at Texas A&M University invites application for the position of electron microscope specialist. Applicants should possess a working knowledge of WDS and EDS spectrometers and accompanying computer and software programs and preferably have experience in the geological sciences.

The primary duties of the position are to oversee and maintain (with the aid of service contracts) the electron microscope and ancillary equipment and to assist in teaching graduate course laboratories dealing specifically with electron microscope analysis.

Salary will be a maximum of \$20,000-12 months. Applicant should send supporting data and letter of recommendation to:

Dr. E. L. Thurton
Texas A&M University
Biological Sciences Building
College Station, Texas 77843

Texas A&M is an equal opportunity/affirmative action employer.

Research Associate in Geochemistry/University of Chicago. Post-doctoral position involving extraction of micro-samples from meteorites under clean conditions and analysis for major and trace elements by instrumental and radiochemical neutron activation. Goal is to investigate behavior of the elements during condensation of the solar system.

Experience in geological samples an asset. In meteorites a definite plus and in radiochemistry a necessity. Send vita and names of two referees to Professor Lawrence Grossman, Department of Geophysical Sciences and Enrico Fermi Institute, University of Chicago, Chicago, Illinois 60637.

The University of Chicago is an affirmative action/equal opportunity employer.

Geophysicist. Faculty position for 12-month, tenure track appointment. A sea-going marine seismologist with interests in seismic reflection, refraction or microseismics is sought. Candidates with strong backgrounds in non-marine seismology or other branches of marine geophysics will also be considered.

Duties include maintaining active research programs and obtaining outside funding, teaching graduate courses and supervising graduate students. Rank is Associate Professor.

Applicants who meet all requirements, but have less experience than is normally required for Associate Professor rank, will be considered for appointment at the rank of Assistant Professor. Salary—\$24,000 to \$32,000, commensurate with experience.

Send resume and names of three references by October 1, 1981 to: G. Ross Heath, Dean, School of Oceanography, Oregon State University, Corvallis, Oregon 97331.

OSU is an affirmative action/equal opportunity employer.

City University of New York, (Brooklyn College): Faculty Positions. The Department of Geology anticipates filling several tenure track positions at Full Professor level. (Salary range up to \$43,000). Highly qualified individuals will be considered for distinguished appointments as an additional \$5,000.

While candidates who have distinguished themselves in any field are welcome to contact us, we are particularly interested in openings in: energy resources (coal, petroleum), exploration geophysics, environmental geology or hydrogeology, coastal sedimentology, and gravity.

Please apply send a letter of interest to Dr. S. O. Schlüter, Chairman, Department of Geology and Geophysics, University of Hawaii, 2625 Correa Road, Honolulu, Hawaii 96822 (808 946-7826), or Dr. C. E. Hesley, Director, Hawaii Institute of Geophysics, same address (808 948-6760). Open until filled.

Brooklyn College, CUNY, is an affirmative action/equal opportunity employer.

University of Hawaii: Faculty Positions. The Department of Geology and Geophysics and the Hawaii Institute of Geophysics have openings for the 1981-1982 academic year. Rank is open dependent on qualifications. We are seeking persons who will participate in our teaching and research program in any of the following areas: (1) structural geology and marine tectonics, (2) hydrology and environmental geology, (3) marine seismology, magnetics and gravity. To apply send a letter of interest, a current vita, and 3 letters of reference to Dr. S. O. Schlüter, Chairman, Department of Geology and Geophysics, University of Hawaii, 2625 Correa Road, Honolulu, Hawaii 96822 (808 946-7826), or Dr. C. E. Hesley, Director, Hawaii Institute of Geophysics, same address (808 948-6760). Open until filled.

The University of Hawaii is an affirmative action and equal opportunity employer.

California Space Institute, University of California, Santa Barbara Research Position in Remote Sensing. Basic and applied research in some combination of remote sensing of coastal zones, land-use/land cover, natural and agricultural vegetation, and soil moisture with skills in information systems, automated image analysis, and quantitative modeling. We seek an independent worker with the goal of deepening and widening existing work in these areas on this campus. Ph.D. preferred. Rank and salary commensurate with experience. Closing date: November 30, 1981. Submit: resume, a brief account of research interests, and names of three professional referees to Dr. Harold D. Craft, Jr., Acting Director, NAIC Observatory, Space Sciences Building, Cornell University, Ithaca, New York 14853. NAIC/Cornell University are EOE/AE.

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URANIUM DEPOSITS. If you are financing, planning, designing, exploring, drilling, or digging in connection with any form of energy, you need this complete, up-to-date book about the world's uranium deposits. Includes production and reserves for mines. Hardcover 6 x 9 inches, 303 pages, Table of contents, drawings, index, references, \$36. Talsach Associates, 120 Thunder Road, Sudbury, Mass. 01776.

Meetings

First Announcement for AGU Chapman Conference on Discontinuities in Rock

An AGU Chapman Conference, 'Discontinuities in Rock, Their Role and Significance in Geologic Processes,' will be convened by Lawrence Teufel and Robert Flecker at Bishop's Lodge near Santa Fe, N. M., May 3-6, 1982.

Technical Description

Tectonic deformation of rock in a supracrustal environment (low pressure and temperature) characteristically produces visible discontinuities. Discontinuities strongly affect the elastic properties, mechanical strength, and hydraulic properties of the rock mass. Mechanical and hydraulic properties of discontinuous rock have become subject to detailed research only recently. Accumulating data indicate that discontinuities are both the dominant flow paths as well as the weakest links in rock mass stability. Moreover, laboratory and field data now demonstrate clearly interaction between mechanical and hydraulic behavior. These studies prove that stress-flow behavior of a single discontinuity is nonlinear. In addition, recent laboratory research on jointed rocks indicates specimen size scale effects.

The mechanisms of formation, and the mechanical and hydraulic behavior of individual geologic discontinuities, have been addressed both empirically and theoretically. However, constitutive representation for rock that contains numerous discontinuities, and incorporates the interaction and the interdependence of discontinuities, has not been well established. How can we formulate and predict the in-situ bulk deformational response and the coupled hydraulic properties of rock containing discontinuities? We need better understanding of the factors that influence the in-situ behavior of discontinuous rock; it is of fundamental importance to the earth sciences. Improved understanding will have significant impact on exploitation of hydrocarbon and mineral resources, the construction of engineering works, development of geothermal energy, and isolation of radioactive waste.

This conference will consider geologic discontinuities as a multidisciplinary problem involving geologists, geophysicists, engineers, hydrologists, experimentalists, and theoreticians. The conference will bring together individuals of diverse research expertise, but with a common interest in the mechanical and hydraulic response of discontinuous rock, in order to integrate current knowledge and to initiate new research ideas and collaborations. Proposed topics of the conference include: (1) mechanics of formation, and characteristics of geologic discontinuities; (2) mechanics and constitutive laws of a single discontinuity and a discontinuous rock mass; (3) deformational processes and geophysical phenomena of discontinuous rock; (4) fluid flow through a single discontinuity and hydraulic properties of a discontinuous rock mass.

Deadline for application is December 15, 1981.

Conference Committee

Lawrence Teufel, Sandia National Laboratories, Albuquerque, N.M.; Robert Flecker, Los Alamos National Laboratory,